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Conference Paper

Trajectories of Learning across Museums and Classrooms

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Abstract

This paper explores the use of social and mobile technologies on school field trips as means of enhancing the visitor experience. It employs the notion of a 'trajectory' (Ludvigsen et al. 2010; Pierroux et al., 2010; Littleton & Kerawalla, 2012) as appropriate means of connecting learners temporal experiences with informal and formal learning contexts. The focus of the analysis is on a group's trajectory with an aim to examine the meanings made and represented in multimodal 'ensembles' and further, to explore whether artefacts and tools encountered or used inform students' ensembles and assist them in making connections across the settings. This paper aims to contribute to contemporary discourse on technology-enhanced museum learning by exploring aspects of the visitor experience, such as meaning making across and between contexts.

Overview/

The paper is concerned with the potential of social and mobile technologies to support learning and visitor's experience across museums and classrooms. It draws on a wider research project, which aims to contribute to a better understanding of the characteristics of mobile learning in the context of formal education museum visits and investigate the role that social and mobile technologies have to play in prolonging the visitor experience. The aim of this study was to integrate a Year 9's work on a specific area of KS3 history curriculum ('Equality and Beliefs') into a long trajectory of whole class activities ('projected class trajectory') with specific goals that span over several sessions in both the museum and the classroom. The study sought to explore how students' interpretive skills, as well as understanding on disciplinary knowledge (eg, civil rights) develop over time and are materially realised over several modes (visually, writing, oral). The investigation particularly focused on the role that tools play in mediating this process.

The increasing use of social and mobile technologies is arguably challenging existing perceptions of time (and space) and modes of communication. Such technologies, when used during a school visit to a museum, might offer the means for making connections with the classroom or other contexts, and create, thus, the right conditions for learning. This paper, hence, employs the concept of a trajectory' (Ludvigsen et al. 2010; Littleton & Kerawalla, 2012) as appropriate means of connecting learners temporal experiences with artefacts/museums and formal learning contexts and prolong the visitor experience.

The main argument put forward here is that looking at students' activities with respects to time dimension and examining their multimodal 'ensembles' and how these interweave with use of tools or other resources, we can capture a sense on how students' meaning is made and materialised. In this paper only an analysis of a group's multimodal presentation and one of the members' meaning map will be presented to indicate how this analysis may enable us to re-construct the group's trajectory, recover aspects of the overall learning experience and discuss implications for design of school museum visits.

Background

Learning is defined by the concept of time: is a process that happens over time. The same applies to museum learning; prior experiences, knowledge and perceptions determine the way one experiences and makes meanings from a visit to a museum. What one has experienced in the museum, however, may not become apparent, unless

specific events or circumstances in one's life allow for it to arise. Museum learning is thus, defined by temporal connections - it can be extended and augmented, depending on what sorts of connections a person realises, recognises and acknowledges, as well as makes to past or future interactions with other people, things, ideas or institutions.

Mercer (2008) states that school based learning and teaching has “a natural long-term trajectory and cannot be understood only as a series of discrete educational events” (p. 33). He refers to ‘trajectory’ as a concept that could help the teacher (or the researcher) to track the learners’ experience as a series of events and note continuities or discontinuities for those who are involved in this. Rasmussen (2005) uses the concept of participation trajectory to highlight the pattern of children’s involvement in a particular, extended classroom activity from its inception to its conclusion some weeks later. She describes the development of participation trajectories, in terms of exploring how the domain is introduced by the teacher, and the ways in which the student interprets, alters, resists and accepts, concepts that arise during front-of-class teaching and discussions held with both the teacher and with peers. Drawing on Rasmussen’s work, in the ‘Personal Inquiry’ project the investigation focused on the role that new technologies play in mediating this process (Littleton & Kerawalla, 2012). Also, Pierroux et al. (2010) employ the concept of trajectories to investigate group interactions using a multitouch table, where the overall aim was to integrate this work into a trajectory of whole class learning activities that span across a two-day workshop.

Framing the research question

One of the challenges when it comes to planning and organising school trips to museums is to ensure that students have a connected, cohesive and cumulative experience of the activities taking place, as well as ideas involved and that these can be made relevant for their meaning making when moving across settings. Problems in connecting encounters with artefacts and ideas on visits to museums involving pre- and post visit school activities have been reported in research (Griffin 2004; Pierroux 2009). This paper deals with this challenge and aims to investigate the role that new technologies might play in facilitating such an experience.

To address this challenge empirical material from a group’s ‘ensembles’ (meaning maps and presentations) will be presented. These ensembles are viewed as material realisations of the meanings made by groups of students in their trajectories across museums and classrooms. This paper seeks to examine whether artefacts/objects and tools encountered or used during the activities inform students’ ‘ensembles’ and assist them in making connections across the settings. It is, further, set to explore how

participants meanings' and development of understanding is made relevant for their own learning. The paper will thus, look for signs which show 'connection building' (Littleton & Kerawalla, 2012, p.32) of ideas and development of understanding among the members of the group.

The main question that this paper poses is:

How do social and mobile technologies mediate connections across museums and classrooms, which are made relevant for students' meaning making processes?

In what follows, a section which describes the frameworks and the analytic approach used for this paper will be presented.

Theoretical framework for considering meaning

This paper explores the notion of meaning, particularly as applied to museum context. 'Meaning making' generally refers to an active interpretation of objects and events, through which an individual or a group develops a personal meaning, deeply integrated with one's own values, beliefs, feelings, and aspirations (Kritskaya & Dirkx, 2000; cited in Kaptelinin 2011). To help frame this inquiry, the paper draws on sociocultural perspectives of learning, which focus on the role of mediating tools and artefacts in the development of understanding.

Meanings, according to multimodal social semiotic approach, are made through the process of materially realising signs and transforming available resources into new signs (Diamantopoulou, 2008 p. 87). Meaning is, hence, represented in various modes (visual, oral, writing) and media (eg, paper, painting, online platforms), whereas modes are culturally available resources that the people engage with when making meanings (Jewitt & Kress, 2003). Multimodality takes into account the presence of modes, both as a resource for materially realizing and recovering meanings (Diamantopoulou, 2008, p. 88). This approach is employed here in the analysis of students' 'ensembles' because it is an analytic and interpretative framework that allows for modes such as writing, image and speech, not only to be looked up in conjunction with each other, but also with the social context and the 'activity' itself which generates them. The analysis, at the first level, provides descriptions of the resources and at a second level, descriptions and interpretations of their use, in relation to the research question of this paper.

This paper focuses on one group and presents empirical material from two specific activities in its trajectory: the meaning maps and multimodal presentations (Fig.1, in red fonts), both taking place in the classroom. Figure 1, adopted by Steier & Pierroux (2011, p. 145), provides an overview of the activities, the ‘objects’ of these activities and physical resources available to students when moving across the activity settings.

Insights into this group’s work is based on the assumptions that learning can be made accessible to us through the material realisation and representation of young people’s production. Further, that meaning and aspects of the students’ overall learning experience throughout this project, can be recovered by viewing and analysing these ensembles in relation to the social context and the activity. We endeavour to reflect on the tools and resources participants used to mediate connections and make meaning as they progress across settings.

Methods and Data Collection

The study

Description

The museum visit was designed around the theme ‘Equality and Beliefs’, which is related to the Key Stage 3 (KS3) history curriculum. Museum of London (<http://www.museumoflondon.org.uk/English/>) (MoL) was selected as the site of the study because the Galleries of Modern London provide appropriate links to KS3 Scheme of Work.

Participants

The participants were a Year 9 history class (13-14 years old) in a secondary school in Milton Keynes (in total 29 children).

Design and Data collection

Prior to the visit to the museum each of the participants was asked to create a ‘Personal Meaning Map’ (PMM) (Adams et al., 2003) about the concept ‘civil rights’. Each student was given a blank A4 paper (entry PMM), on which the term ‘civil rights’ were written in the centre. After the visit and once the project work was finished each student was given back his/her original A4 paper and was asked to update, make changes or additions to what s/he has already written on the paper in a different colour ink from the original (exit PMM) (in total entry PMM= 27; exit PMM= 25). Also, during the interviews a number of the students were asked to reflect

ACTIVITY SETTING	CLASSROOM/ ICT SUITE		MUSEUM	E-LEARNING STUDIO/ MUSEUM	BUS	CLASSROOM/ ICT SUITE	INTERVIEW ROOM
	Construct a meaning map	Communication within institution (face-to-face and online)	Communication on beyond institutions (school-museum)	Communication within the institution (face-to-face and online)	upload pictures start presentation	Report/reflect on the experience on a camera	Communication within the institution (face-to-face and online)
OBJECT (of activity)							
TOOLS/ RESOURCES	A4 paper pen	images pen/paper textbooks iPhones PCs	PCs online platform (Twitter) museum's website YouTube video	exhibits labels online platform (Twitter) iPhones/camera pen/pencil recorder booklet museum map	iPhones PCs images online platforms (Twitter/Vuvox)	flip camera	online platforms (Twitter/Vuvox) images (from museum) tweets paper post-its
	individual	in groups/ individual	individual	in groups	individual	in groups	individual
DIVISION OF LABOUR							

Table 1 Overview of the projected class trajectory'

and elaborate on their meaning map. An open-question (Q: ‘Can you please guide me through your meaning map?’) was asked in the interview related to the PMM, with an aim to elicit interviewees’ free responses, as well as examine which part of the map the students choose to refer to.

For the visit, the participants were divided into eight groups (of threes or fours). Each group followed a pre-defined trail across the three Galleries of Modern London. Instructions about the trail and the activities were given to each group in a booklet. Each group’s overall aim was to carry out some activities and collect some evidence with the use of mobile technologies and Twitter (notes, pictures, posts) in order to address an inquiry related to the visit’s theme and KS3 curriculum (eg, Which methods/means do people use to remove inequalities in society?) and eventually to create a presentation. Overall, the average time spent in each gallery was 20-25 minutes.

Back in the classroom the students were asked to create a presentation to address their inquiry with the use of an online tool, Vuvox (www.vuvox.com). This work was completed in two sessions. A third session was then required, for each group to present this work to their classmates. During this activity, the students could provide feedback over Twitter on other group’s presentations. During the interviews, interviewees were asked to reflect on this process.

Analysis and Findings

The focus of this analysis will be specifically on identifying signs which show ‘connection building’ among the various ensembles, the meanings made across the settings and the role of the technologies in mediating this. Due to space constraints, the analysis will focus on the first two frames of the group’s presentation and this will be discussed in relation to the meaning map drawn by one member of this group.

Ensemble 1: Presentation

The Table 1 below presents the first two frames from group’s online presentation on Vuvox (www.vuvox.com). The presentation aimed to address the question: How do people change the societies they live in? In each frame, the first row shows the actual presentation, which was prepared in the classroom after the visit (Visual/Textual Mode). The second row shows the text included in each of the frames and the third

row the transcript of the oral presentation that the group gave in front of their classmates (oral mode).

The first frame consists of an image and text on its right. The association between the text and the image is, however, not explicit. The image used in the first frame is a photograph of the suffragettes' medals that the students must have seen in the People's City Gallery, since this image was taken by the group's mobile phone. The medals are artefacts associated with specific connotations: they show suffragette's symbolic colours (green, white, purple) and were awarded to suffragettes who were on a hunger strike. Beyond this, the title put in this frame, in much bigger fonts than the main body of text, is linked to another exhibit in the People's City Gallery. In the presentation itself this link is not clear; yet, research in the museum's collections shows that this phrase was written on a banner in the suffragettes' colour, designed and made by the West Ham branch of the Women's Social and Political Union (<http://bit.ly/GB53PX>). Also, examination of the group's online posts reveals that the students saw the banner during the visit. The tweet shown on Figure 2 demonstrates this. The association of this image to the specific title ('Courage, Constancy and Success') and the references to women's rights in the main text might be an evidence that this group views women's movement as having these qualities.



Fig. 2 Tweet posted by the group in the People's City Gallery

In the main body of the text the group differentiates between the suffragettes and suffragists, on the basis of the methods each group used: violent and peaceful methods. They support the latter by referring to other exhibits they might have seen in the museum (posters and clothing). One may notice the use of a specific phrase in both the text and the oral presentation and that is "sparks of action". This term was also included in a tweet this group posted during the visit (Fig. 3). In the tweet in Figure 3 and the tweet in Figure 4, it could be also observed that the group refers to the posters as a peaceful method of protest, something mentioned in the presentation too.

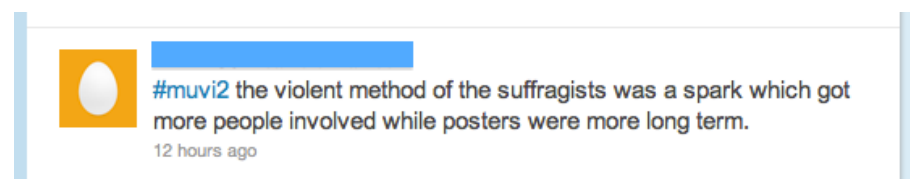


Fig. 3 Tweet posted by the group in the People's City Gallery

Frame A	
Visual/ Textual mode	 <p>Museum of London 2011.</p> <p>Courage, Constancy & Success</p> <p>The suffragists used violent methods which caused sparks of actions among the people. While the suffragettes used more peaceful methods with posters and clothing. These methods were long term and were most effective on the every day citizen.</p> <p>The world war is debatable it may of helped womens rights</p>
Text	<p>Courage, Constancy & Success</p> <p>The suffragists' used violence methods which caused sparks of action among people. While the suffragettes used more peaceful methods with posters and clothing. These methods were long term and were more effective on every day citizen. The world war is debatable, it may of helped womens' rights.</p>
Oral Mode	<p>Courage, Constancy and Success: the suffragists used violent methods, which caused sparks of actions (2s), while the suffragettes used peaceful methods/processes, which were long term, most effective for the everyday citizens. The world war mainly helped the women's rights.</p>
Frame B	
Visual/ textual mode	 <p>Museum of London 2011.</p> <p>Courage, Constancy & Success</p> <p>This is actually a protest because someone is trying to get the view across. This was in the time when 1975 when black people where trying to get equality.</p>
Text	<p>This is actually a protest, because someone is trying to get the view across. This was the time when 1975 when black people where trying to get equality.</p>
Oral Mode	<p><the key of bringing the white> poster, it's sort of – it's still . (1s) protesting, it's not physical like - it's, it's a peaceful method, it's not the best type of method for some people, but people still, they are still protesting because someone doesn't agree with what people are saying, doesn't what to do what people, other people say and trying to get their view across, well in 1975 where black people are trying to get <voted>.</p>

Table 1 First two frames of the group's multimodal presentation

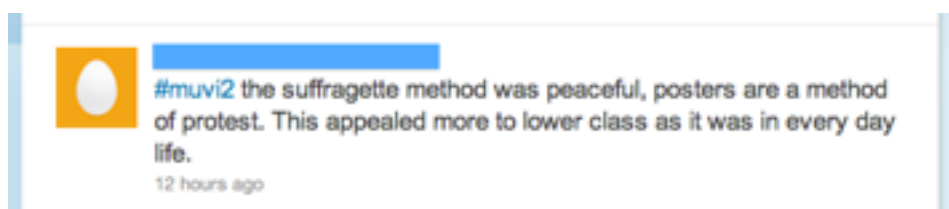


Fig. 4 Tweet posted by the group in the People's City Gallery

Further to that, the last sentence in the first frame refers to the World War. This might be related to the trail the group took in the museum, because next to the suffragettes' collection in the People's Gallery there was a collection around the World War II. It might be also linked to the course of work this class was doing before this research project started. It is of interest to note the use of the word 'debatable' in the presentation; the members of the group might have debated on this. In their speech, this became a definite sentence: 'the world war mainly helped women's rights'.

Similarly to the first frame, the second frame also consists of an image and text on its right. However, there is no title in this frame. Further, the students here make explicit associations between the text and the image, which was captured with their mobile phone in the World's City Gallery. They place the image in time: 'this was the time when in 1975 [...]', which as a year is marked by 'black people [were] trying to get equality'. What is shown on the photograph is a black woman, standing in front of her house's main door, on which, presumably, white people wrote 'Keep Britain White'. It should be noted that the students named this image as 'white poster'. The students provide no description of the image, neither in the text nor in the speech. Yet, by using 'this' in their text, it is clear that they refer specifically to the image and in fact, they interpret the image as a sign of a protest: "this is actually a protest". Moreover, they spent almost all the time of their speech making a point why, probably in contrary to what they believed so far, this image provides evidence of a protest:

"the key of bringing [...] it's sort of – it's still protesting, it's not physical, like - it's, it's a peaceful method, it's not the best type of method for some people, but people still, they are still protesting".

It could be argued that this image challenged students' view about what a protest is like ('it's still protesting, it's not physical'), yet for them the definition has not altered: people protest to get their point across. They also provide an evaluation that this is not the best method. A similar evaluation was done on a tweet this group posted during the visit and was referring to the same exhibit ('is a protest not a good one') (Fig. 5).



Fig. 5 Tweet posted by the group in the World's City Gallery

In the following section, a meaning map from a member of this group will be analysed and discussed. This meaning map was one of the most comprehensive maps collected. For the purposes of this paper, the analysis will focus only on specific nodes drawn on the meaning map, which are considered appropriate in making links with the analysis of the Ensemble 1. The analysis below also draws on interview data.

Ensemble 2: Personal Meaning Map

In the entry personal meaning map (entry PMM) this student drew seven nodes in total (in black, Fig. 6). Interview data shows that in the entry PMM he was mainly thinking of 'rights. The following extract is indicative:

“when I thought of civil rights, I thought it was just rights, like right to speech, right to freedom, education, fair trial, life...do's and don'ts [...]”

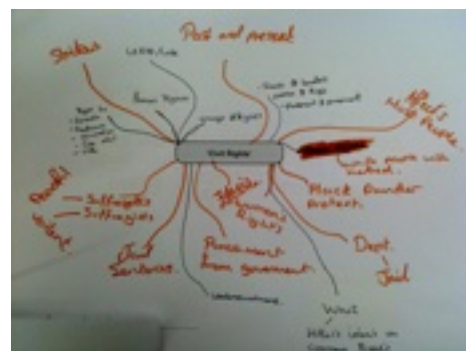
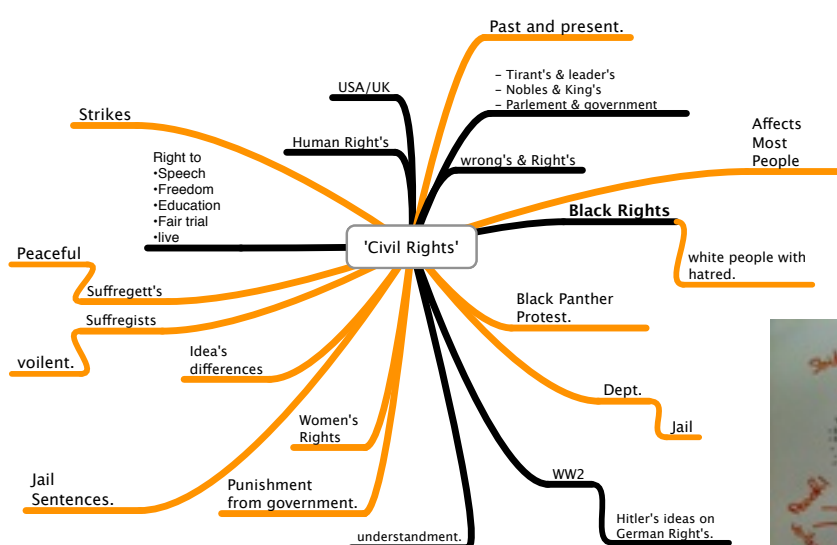


Fig. 6 Student's personal meaning map

We would like to point out to two nodes on this entry PMM. The first, is the node 'WW2'. Here, he draws on a topic recently covered in Year 9 history. His group, as shown in the analysis above, refers to 'world war' in the first frame of their presentation, by writing 'it is debatable, the world war it may of helped women's rights'. The second, is the node 'Black rights'. Initially, the student drew this in black ink, with no further associations to it. In his exit PMM, he highlights this node with orange colour (Fig. 6) and links to it the node "white people with hatred". The word 'hatred' shows a deep and emotional extreme dislike, which this student views as once directed against black people. This is believed to be associated to specific exhibits he viewed during the visit and is demonstrated by two tweets his group posted while they were exploring the 'World's City Gallery' (Fig. 7).



Fig. 7 Tweet posted by the group in the World's City Gallery

The first, as already discussed, refers to the image shown on Frame 2 in the first ensemble (Table 1) and the second to the 'Black Panther' photograph, an image of which was included in the images captured by this group while exploring the galleries. Besides, it could be argued here, that use of the word 'white' in the exit PMM, is associated to the specific exhibit ('Keep Britain White').

In the exit PMM he draws twelve main nodes (in orange, Fig. 6) and four nodes attached to the main ones. So, apart from the node 'Black rights' he draws a number of nodes which are indicative of his overall experience from the visit and the intervention. These are: 'Black Panther Protest'; 'Women's Rights'; 'Jail Sentences'; 'Suffregett's' > 'Peaceful'; 'Suffregists' > 'violent'; 'Strikes'; 'Punishment from government'. Some of these terms were used in the ensemble presented in the previous section (eg, suffregists, suffragettes, peaceful, violent). The terminology used in these nodes is also indicative of terminology associated to civil rights. He also seems to introduce the dichotomy 'Past and present' to his current understanding of the concept. He specifically refers to this aspect in the interview:

"In past, you know you got strikes, had suffragettes, suffragists, violent, peaceful, jail sentences and you think "Oh, what that has to do with civil rights?" because if [...] they didn't get their rights or they argue for it, they were going to jail. You got (debt) and people who were trying to stand up for what their rights are (...?) women rights, black rights, idea and differences, punishments from government. **It affects most people, it doesn't affect just a group of people in a little village. You'd expect like, government, like, when we get new people in the parliament, doesn't just affect Broughton, it affects the whole of Milton Keynes [...]**"
(emphasis here)

With his last two sentences, this student chooses to talk about the node 'Affects Most People' and he also sheds light on the word 'present' in the 'Past and present' node. He views 'civil rights' concept as a continuum, with associations with the past and the present. Notably, he relates this to his own life and makes associations to his 'world' (eg, Broughton, Milton Keynes). He realises that "we", meaning citizens, have the power to "get people in the parliament" but he also seems to understand that politics, in a broader sense, not only affected people's lives in the past, but are also relevant to his own life.

Discussion

This paper sought to investigate whether artefacts/objects and tools encountered, used or created during the activities in the museum and the classroom inform students' 'ensembles' and assist them in making connections across the settings. It was, further, set to explore how participants' meanings and development of understanding is made relevant for their own learning. The analytic attention, hence, was towards identifying signs of 'connection building' of ideas and development of understanding among the members of the group. In order to address this question, data collected from one group's trajectory and two of their 'ensembles' were presented and analysed.

The analysis shows that this group's 'ensembles' emerged as responses to what its members have experienced during the visit and reflect their collective experience. It is argued that the elements used in the multimodal presentation and the textual nodes in the meaning maps (eg, terms, images) 'stand for' items that were particularly salient for the students and as such they constitute the sense and significance of artefacts/objects and the students' learning. The 'ensembles' are shaped by students' own interests and choices made during the visit, as well as the social context within they were produced. According to Wells (1997)

“meanings are also strongly influenced by the connection made by participants to related experiences, both personal and collective. These exist on several time scales: within the current activity/discourse; within the participants’ individual and collective’s experience of similar or related activities in their community; within the history of the activity in the culture more generally [...]”(cited in Ash, 2002, p.395).

It was evident from the analysis of the meaning map, that this student has developed an understanding over time, which was made relevant for him. He currently understands that the ‘civil rights’ is not an abstract concept; he refers to his locality, adds the time dimension to his current understanding and views himself as a citizen by using the first person (‘we’). The meanings made were relevant and meaningful for him. In other words, this student manages to bridge between the familiar and new ideas, which, as Littleton & Kerawalla (2012) claim, is a “complex pedagogic achievement, and should be carefully resourced, supported and accomplished, rather than simply assumed” (p.43). He also drew nodes that acknowledges things that his group encountered in the museum (eg, ‘Black Panther’ protest) and it was evident that he made use of the comments that his group posted online.

In terms of identifying whether tools and artefacts inform student’s ensembles and assist in making connections across settings, analysis shows that images taken during the visit with the mobile phone, artefacts seen while exploring the collections and tweets posted were employed by this group to prepare the presentation and give answers to their inquiry. It is suggested that use of social and mobile technologies made possible to transform the ‘objects’ of the activity in the museum (Table 1, eg, take pictures, select objects, post comments online) into communicative resources/ artefacts that the students could draw later on for executing other activities. Since Twitter is a web-based platform, the group’s images and comments existed across contexts and beyond the confines of their group itself, and eventually helped to resource and support future activities. The content generated by the use of such technologies provided a ‘stepping stone’ from which knowledge and understanding were built and the experience extended. It further, allowed the students to re-visit, re-connect and put into a new context their group’s or class’ experiences and knowledge and make this accessible to other ‘audiences’. This is, arguably, a key point when designing activities across settings, which sometimes might be seen by learners as lacking continuity and being compartmentalized.

Having said these, we acknowledge the fact the paper analyses a small fraction of the data collected from the research project. It should be noted that analysis of the students' 'ensembles' in relation to the face-to-face interactions the students had, might contribute new insights into this investigation and strengthen then argument presented. Further to this, it was observed that not all the students' followed the 'projected class trajectory', rather they constructed their own learning trajectories. It is, thus, worth to re-construct these trajectories and analyse several moments and 'ensembles' to identify patterns of participation and examine what worked or not and what the implications are for the design of such visits to museums.

Conclusion

This study contributes insights into how use of social and mobile technologies mediate connections made by the participants, demonstrating development of their conceptual understanding and building of knowledge through joint activities. This is viewed as an opportunity to engage critically with what learning with new technologies in a museum means as it is extended over time and across settings.

The main argument presented here is that looking at students' activities with respects to time dimension and examining their multimodal 'ensembles' and how these interweave with use of tools or other resources, we can capture a sense on how students' meaning is made and materialised. It is shown that this enables us to recover aspects of the learning experience and opens up possibilities for building up a picture of emergent practices driven by the students' interests and discuss implications for design of school museum visits.

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